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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

November 9, 1992

By Courier

Office of the Secretary
Federal Communications Commission
Washington, D.C. 20554

Ladies and Gentlemen:

Enclosed for filing on behalf of LCC Incorporated ("LCC") are the following documents:

1. One original and six copies of LCC's comments (the "Comments") on the Notice of Proposed Rule Making and Tentative Decision, General Docket No. 90-314, ET Docket No. 92-100, in the matter of the amendment of the Commission's rules relating to the establishment of new personal communications services; and

2. One additional copy of the Comments, which should be file stamped and returned to our messenger.

Please feel free to contact the undersigned if you have any questions regarding the Comments.

Very truly yours,

John S. Fischer
General Counsel

cc: Rajendra Singh
Lou Olsen
Phillip L. Spector, Esq.

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)

)
Amendment of the Commission's)
Rules to Establish New Personal)
Communications Services)

GEN Docket N° 90-314
ET Docket N° 92-100

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To: The Commission

MAIL BRANCH

Comments of LCC Incorporated on

Notice of Proposed Rule Making and Tentative Decision

LCC Incorporated
John S. Fischer
General Counsel
2300 Clarendon Boulevard, Suite 800
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November 9, 1992

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To: The Commission

Comments of LCC Incorporated on

Notice of Proposed Rule Making and Tentative Decision MAIL BRANCH

INTRODUCTION

LCC Incorporated ("LCC") respectfully submits these comments pursuant to the procedures set forth in the Notice of Proposed Rule Making and Tentative Decision, General Docket No. 90-314, ET Docket No. 92-100, in the matter of the amendment of the Commission's rules relating to the establishment of new personal communications services. LCC's comments will focus on the propagation issues raised in Appendix F to the Notice.

BACKGROUND

LCC is one of the preeminent United States companies engaged in the engineering and design of wireless communications systems. LCC has been involved in cellular radiotelephone system design since 1982, when it began to engineer many of the early cellular systems. Today, LCC is an industry leader in cellular system design in the United States and in numerous foreign countries. LCC has also been actively involved in the development of personal communications services ("PCS"). In this regard, LCC is

currently performing engineering analyses for several parties which have filed PCS pioneer's preference requests in the United States. LCC also participates on several PCS industry committees in the United States. In addition, LCC has provided engineering design services to one of the PCN licensees in the United Kingdom.

One of LCC's core proprietary technologies consists of propagation prediction software. LCC has developed sophisticated computer models to predict propagation in the wireless communications environment. LCC has also developed proprietary measurement equipment that allows propagation data to be collected and analyzed on a real-time basis. In addition, LCC has developed methods that allow actual measured data to be integrated with computer-generated predictions to improve and fine-tune the accuracy of propagation prediction.

Since 1989, LCC's propagation prediction software and measurement equipment have been utilized to collect and analyze propagation characteristics in the 1850 MHz frequency range. These efforts were undertaken to improve LCC's understanding of, and its ability to engineer in, the PCS frequency bands. The extensive data collected by LCC in this effort encompasses major cities in the United States and in Europe. Given its unique experience, LCC believes that it is qualified to comment on the propagation issues discussed in the Notice.

COMMENTS ON APPENDIX F

General. LCC concurs with the Commission on several key points raised in Appendix F. In particular, LCC agrees that:

- * Summation of power from each PCS base, mobile and portable unit

is the correct approach;

- * A minimum radius of 125 miles (based on height limitation) is sufficient to preclude interference; and
- * Establishing interference criteria based on EIA/TIA Bulletin TSB10-E is acceptable. Although EIA/TIA Bulletin TSB10-E appears to be very conservative in the area of interference, industry groups are attempting to modify the standard to account realistically for wireless services. In this regard, LCC recommends that the Commission's rules should incorporate any future changes to EIA/TIA Bulletin TSB10-E to ensure that up-to-date standards are in place.

LCC agrees and supports these underlying assumptions for predicting the PCS interference to be experienced by fixed microwave users. When applied carefully, these assumptions will contribute significantly to ensuring the accuracy of interference predictions and the protection of microwave users. These assumptions should also protect PCS operators from interference from microwave users.

Buildings. All discussions of PCS propagation must take into account the effects of buildings and other structures. LCC expects many PCS sites to have relatively low radiation centers and to be located significantly below building tops. In addition, many sites will not have line of site conditions due to blockage by buildings. Buildings can also be significant reflectors of energy and cause interference in unexpected areas. PCS portable stations may be located at or near the top floors of buildings. These

effects can be accurately predicted using today's technology.

LCC recommends that the Commission adopt standards for interference prediction that include the effects of buildings. Several good propagation models exist today that utilize building height and location information. Propagation prediction using building information is already an accepted practice in large cities such as Los Angeles and New York. LCC believes that adoption of this recommendation will improve the accuracy of PCS propagation predictions and result in decreased unexpected interference.

In general, LCC recommends the following method for predicting the effect of buildings and other structures: for a typical city block (or a bin size of no greater than 100 meters X 100 meters), the signal strength should be computed based on median building height. If buildings are absent, terrain height may be used (as is commonly done today).

Base Stations. LCC agrees with the approach described in Appendix F for base stations. In particular, the power from all PCS stations should be added to determine the total energy delivered to the microwave receiver antenna and the microwave receiver. Models currently used for point to point microwave predictions are acceptable for interference prediction, provided they include the effects of buildings. Most microwave prediction tools rely on a terrain database to determine whether or not a path is obstructed. Buildings can be added to the terrain database to allow the model to determine accurately whether or not a PCS base station has an obstructed path.

This technical approach is relatively easy to implement with today's computers

and databases. Using this approach, the accuracy of interference predictions would be greatly improved. As described above, the computation requires the median building height of a city block (or a 100 meter X 100 meter area) to be included in the path loss predictions.

Mobile Stations. LCC agrees with the Commission's suggested approach of summing the signal level of all cells and using a 5 foot antenna height.

LCC believes that two propagation models are appropriate for mobile units. The first is the Okumura model, modified to include diffraction and the effects of buildings. LCC does not believe that the Okumura model by itself is suitable.

The second recommended propagation model is known as the COST-231 Walfish-Ikegami model. This model includes key components of building height and street orientation. This model has been tested extensively in the United States and in other locations around the world. These tests have shown that the COST 231 Walfish Ikegami model can be more accurate than other commonly used models.

LCC recommends that the FCC adopt the COST 231 Walfish-Ikegami model for predicting path loss and interference for the mobile end of the PCS link. LCC also recommends that building height information be required for all PCS interference predictions.

Portable Stations. LCC agrees with the Commission's proposal to treat portable stations much the same as mobile stations. In this regard, LCC recommends using the same propagation models referred to in the previous section regarding mobile stations. LCC wishes to stress, however, that in this instance the method of including building

heights must be adjusted to reflect the possibility that portables will be used on the tops of buildings and on upper floor balconies. Accordingly, rather than using the median height of buildings within a city block (or 100 meter X 100 meter area), LCC recommends using the maximum height for propagation predictions. By doing so, the worst case scenario can be represented in interference predictions. If the actual maximum height is not used, misleading results will occur and interference will be underpredicted.

LCC concurs with the Commission's suggested weighting with respect to the distribution of portables in urban areas (*i.e.*, 45% on street; 50% in building; 5% on rooftop). LCC recommends that weighting factors also be adopted for suburban areas.

The building penetration losses mentioned by the Commission are consistent with the experimental data which LCC has collected and analyzed; *i.e.*, buildings typically exhibit a 20 dB penetration loss and houses exhibit a 10 dB penetration loss.

CONCLUSION

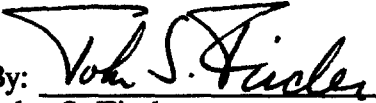
The above comments are based on advanced, yet proven, technology for predicting propagation and interference. LCC believes that these techniques will help ensure accurate predictions in order to allow band sharing and prevent interference.

LCC lauds the Commission for its continuing commitment to advancing PCS. By encouraging the development and implementation of PCS, the Commission will help to enable the United States to remain the global technical leader in wireless telecommunications. The American public will surely benefit as a result. LCC hopes that the Commission's final rules will also enable United States companies to maintain

the same technical leadership in the area of PCS propagation and interference prediction.

Respectfully Submitted,

LCC INCORPORATED

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